

This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found [here](#).

If you have a suggestion to make the keys better, please fill out the short survey [here](#).

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

1. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \rightarrow 1^-} \frac{7}{(x+1)^8} + 9$$

The solution is $f(1)$, which is option C.

- A. ∞
- B. $-\infty$
- C. $f(1)$
- D. The limit does not exist
- E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

2. Evaluate the limit below, if possible.

$$\lim_{x \rightarrow 7} \frac{\sqrt{9x-38}-5}{2x-14}$$

The solution is 0.450, which is option A.

- A. 0.450
- * This is the correct option.

- B. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

- C. 0.050

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

- D. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

- E. None of the above

If you got a limit that does not match any of the above, please contact the coordinator.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.

3. Based on the information below, which of the following statements is always true?

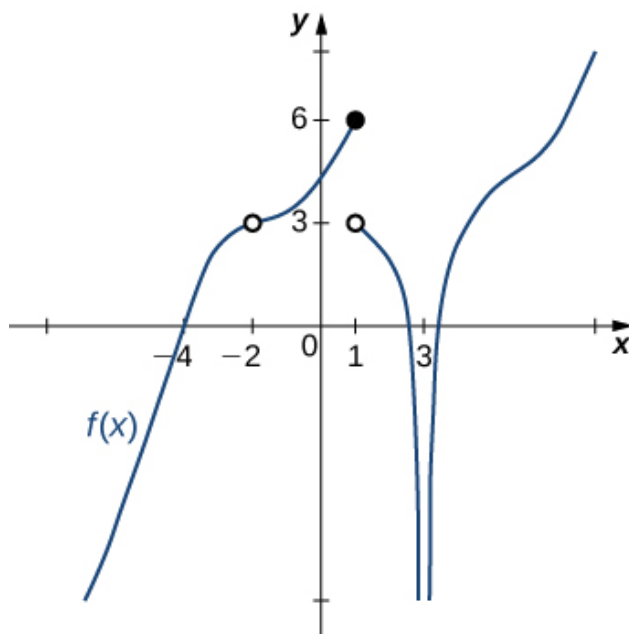
$f(x)$ approaches 5.689 as x approaches ∞ .

The solution is $f(x)$ is close to or exactly 5.689 when x is large enough., which is option D.

- A. $f(x)$ is close to or exactly ∞ when x is large enough.
- B. x is undefined when $f(x)$ is large enough.
- C. $f(x)$ is undefined when x is large enough.
- D. $f(x)$ is close to or exactly 5.689 when x is large enough.
- E. None of the above are always true.

General Comment: The limit tells you what happens as the x -values approach ∞ . It says **absolutely nothing** about what is happening exactly at $f(\infty)$!

4. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \rightarrow a} f(x) = 3$.



The solution is Multiple a make the statement true., which is option D.

- A. -2
- B. 1
- C. $-\infty$
- D. Multiple a make the statement true.
- E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

5. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \rightarrow 8^-} \frac{-8}{(x-8)^3} + 5$$

The solution is ∞ , which is option B.

- A. $-\infty$
- B. ∞
- C. $f(8)$
- D. The limit does not exist
- E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

6. To estimate the one-sided limit of the function below as x approaches 9 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{9}{x} - 1}{x - 9}$$

The solution is $\{9.1000, 9.0100, 9.0010, 9.0001\}$, which is option E.

- A. $\{8.9000, 8.9900, 8.9990, 8.9999\}$

These values would estimate the limit of 9 on the left.

- B. $\{8.9000, 8.9900, 9.0100, 9.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

- C. $\{9.0000, 9.1000, 9.0100, 9.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 9 doesn't help us estimate the limit.

- D. $\{9.0000, 8.9000, 8.9900, 8.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 9 doesn't help us estimate the limit.

- E. $\{9.1000, 9.0100, 9.0010, 9.0001\}$

This is correct!

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

7. Evaluate the limit below, if possible.

$$\lim_{x \rightarrow 7} \frac{\sqrt{5x - 10} - 5}{4x - 28}$$

The solution is None of the above, which is option E.

- A. 0.559

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

- B. 0.025

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

C. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

D. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

E. None of the above

* This is the correct option as the limit is 0.125.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.

8. Based on the information below, which of the following statements is always true?

$f(x)$ approaches 8.878 as x approaches 0.

The solution is $f(x)$ is close to or exactly 8.878 when x is close to 0, which is option A.

A. $f(x)$ is close to or exactly 8.878 when x is close to 0

B. $f(x)$ is close to or exactly 0 when x is close to 8.878

C. $f(x) = 0$ when x is close to 8.878

D. $f(x) = 8.878$ when x is close to 0

E. None of the above are always true.

General Comment: The limit tells you what happens as the x -values approach 0. It says **absolutely nothing** about what is happening exactly at $f(0)$!

9. To estimate the one-sided limit of the function below as x approaches 3 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{3}{x} - 1}{x - 3}$$

The solution is $\{2.9000, 2.9900, 2.9990, 2.9999\}$, which is option C.

A. $\{2.9000, 2.9900, 3.0100, 3.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

B. $\{3.0000, 3.1000, 3.0100, 3.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 3 doesn't help us estimate the limit.

C. $\{2.9000, 2.9900, 2.9990, 2.9999\}$

This is correct!

D. $\{3.0000, 2.9000, 2.9900, 2.9990\}$

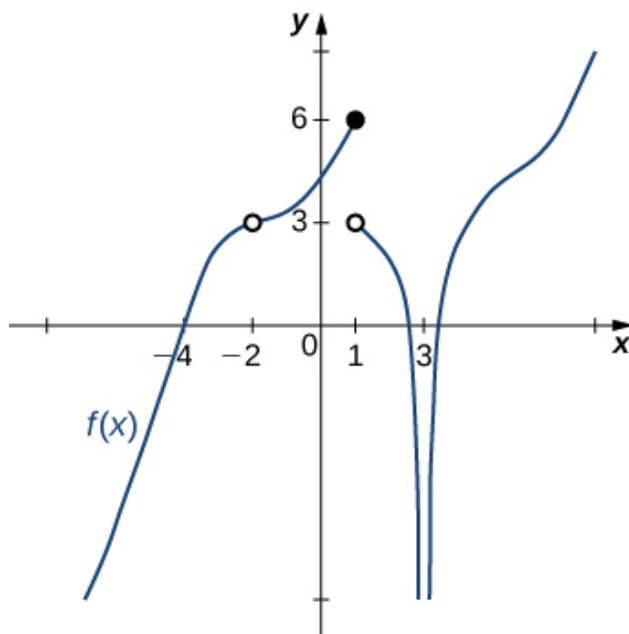
If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 3 doesn't help us estimate the limit.

E. $\{3.1000, 3.0100, 3.0010, 3.0001\}$

These values would estimate the limit of 3 on the right.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

10. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \rightarrow a} f(x)$ does not exist.



The solution is 1, which is option C.

- A. -2
- B. 3
- C. 1
- D. Multiple a make the statement true.
- E. No a make the statement true.

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.
